FABRIC FAULTS PROCESSING: PERFECTIONS AND IMPERFECTIONS

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ABSTRACT

The main part to present in this paper is to focus on the different types of shortcomings of the system that we have implemented in order to enhance the system further for better working. The main objective of this paper is the processing of the defective fabric parts. Also in order to work on the system we have also focused on the qualities of the system. In Textile industry automatic fabric inspection is important to maintain the quality of fabric. This paper proposes an approach to recognize fabric defects in textile industry for minimizing production cost and time since the work of inspectors is very tedious and consumes time and cost. The recognizer acquires digital fabric images by image acquisition device and converts that image into binary image by restoration and threshold techniques

KEYWORDS: Image Processing, Gray Image, Histogram, Thresholding, Flaws

INTRODUCTION

Quality is one of the important factor when it is to be considered in the production of textile fabrics. Fabric quality falls in to two components, i.e., fabric properties and fabric defects. Fabric property is concerned in the field of the raw material, construction parameters and processing methods, and a fabric is considered to be defected when we fail in the right choice of raw material and its processing, it is due to improper input parameters with respect to material, machine and man. Any variation to the knitting process needs to be investigated and corrected [11].

Defects fall into the category. Since when they appear, repair is needed, this is time consuming and sometimes results in fabric rejection. Fabric defect detection has been a long – felt need in the textile and apparel industry. Surveys carried out in the early 1975 shows that inadequate or inaccurate inspection of fabrics has led to fabric defects being missed out, which in turn had great effects on the quality and subsequent costs of the fabric finishing and garment manufacturing processes [22].

Since images are defined over two dimensions (perhaps more) digital image processing may be modeled in the form of multidimensional systems. Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it [3]. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image [5]. Usually Image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them.

Image processing basically includes the following three steps.

- Giving the input to the system through various means such as optical scanner or by digital photography.

- Processing starts by first Analysing and converting in to different stages and further manipulating the image which includes data compression and image enhancement and spotting patterns that are not to human eyes like satellite photographs.

- Output is the last stage in which result can be altered image or report that is based on mainly on the histogram output and the method of the image analysis[21]

BACKGROUND

Paper mainly describes the various problems faced while the processing of the system. It also describes on what ground do one needs to take a particular step forward for the killing of the anomaly occurred in that particular situation Description is done about fault detection, positioning and classification of the faults that exists or can occur in the weaving machine during weaving by using the principle of image processing, an automatic fabric evaluation system, which enable computerized defect detection – analysis of weaved fabrics. This method involves the process of analysing the fabric image capture by a digital camera. The advantage for the manufacturer here is to get a warning when a certain amount of defect or imperfection occurs during the production of the fabric so that precautionary measures can be taken before the product hits the market. Wastage reduction through accurate and early stage detection of defects in fabrics is an important aspect of quality improvement [19]. The problem of web inspection, particularly, is very important and complex and the research in this field is widely open

Natural fabric and synthetic fabric are the two classifications of textile fabric. Synthetic fabrics are fairly new and have evolved with the continuous growth in textile industry. According to the need and constant innovation in textile industry water proof, oil resistant, UV resistant and abrasive resistant fabrics are also available. Natural fabrics use animal's skin, the cocoons of silkworms, plants seeds, leaves and stems. It is soft and durable. It does not change colour due to UV light and there is no warming effect to the user until the material loses its tensile strength. The various types of natural fabrics are cotton fabric, silk fabric, wool fabric, leather fabric, hemp fabric, coir fabric and linen fabric [18].

Fabric texture refers to the feel of the fabric. It is smooth, rough, soft, velvety, silky, lustrous, and so on. The different textures of the fabric depend upon the types of weaves used. Textures are given to all types of fabrics, cotton, silk, wool, leather etc., In textile, different types of faults are available i.e. hole, scratch, stretch, fly yarn, dirty spot, slub, cracked point, colour bleeding etc; if not detected properly these faults can affect the production process massively[18]. The objective of the proposed work is to identify whether the fabric is defective or not. If it is defective then identify the location and the type of the defect [21]

SYSTEM PROPOSAL

The Implemented system that is defined here is ready to properly scan and clearly see every phase of the work, here work defines the various phases of the fabrics that is the each and every part of the fabrics very meticulously so that it will properly put the defects of the fabrics (if any present) to the eye of the supervisor. The system developed should pass through each and every stage of the built system and clearly pass through each and every technical aspect so that the fabric passed will be fault free. The system takes the input the fabrics(faulty or defect free)and goes through a number of phases

for the processing and then it is being concluded to the proper conclusion for the efficient quality assurance and the proper name and the fame of the company and organization producing such goods. Here the conclusion (whether the fabric is having the defects or not) is derived according to the histogram output.

OVERVIEW

Figure 1 gives the brief overview of the system with explanation of each module.
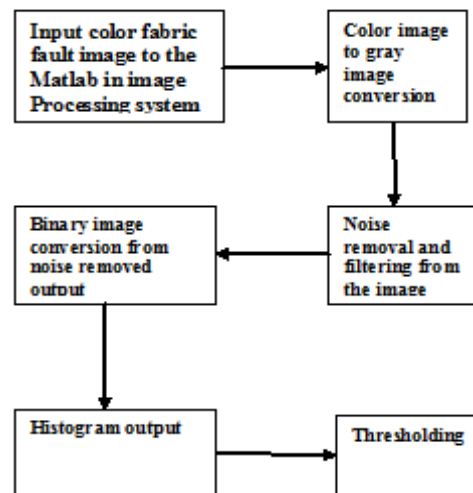
Figure 1: Overview of the Methodology of the Proposed System

- **Input of the Fault Image:** This phase is the initial phase of the system. Here the image is given as the input that is mainly taken by the various input cameras such as CCD (Charged Coupled Device) camera, CMOS (Complementary Metal Oxide Semiconductor) camera, or any basic Digital camera, etc. [4].

- **Conversion of Colour Image to Gray Image:** In this phase the image that is given as the input is converted to the the gray image.[3].

- **Noise Removal and Filtering from the Image:** This phase basically deals with the removal of external noise and disturbances in the image that is given. [4]

- **Conversion to the Binary Image:** Here the image that is removed from noise is being converted to the binary format of the image. [3]

- **Histogram:** A Histogram output obtained from the overall processing is used for drawing the conclusions for the classification of the faults.[10].

- **Thresholding:** Thresholding is the simplest method of image segmentation. From a gray scale image, thresholding can be used to create images in thresholding, the colour-image or gray-scale image is reduced to a binary image. [8].

BENEFITS

System proves useful and a powerful tool for the fabric industries, wherein it used to appoint a huge staff for the sake of Quality and Quality Assurances. Benefits of the system can be summarized as follows

- In future this work may be extended such that the output is given to neural network and the Microcontrollers of any type can be utilized and programmed such that it can detect the faulty fabric part.

- If the microcontroller is connected with motors of any type then it will be operated under normal fabric condition and can stop the motor if there is any fault on fabrics

- System is basically implemented using the Matlab for the reason that the efficient behaviour with the types of images and the ease of the operations to be performed on the various images and at the various level.

- It is easy to identify faults on fabric images and process by using this method. Thus the MATLAB Implementation is done for fault identification such as hole, scratch, fading and other faults on fabrics can be identified and processed.

LIMITATIONS

Limitations in this system is categorised in two categories

- For the Manual System

- For the automated System

For the Manual System

The weakness of this type of the solution is that

- Huge number of staff is to be recruited in large scale industries

- Efficient staff should be appointed without having any disability

- Favourable conditions should be available for the work that is uninterrupted power supply and other favourable conditions

- Human errors is one most important criteria

For the Automated System

Every coin has two sides likewise if there are advantages there are certain disadvantage.

- In this system there are some limitations like the input to the system is the image of the fabric and not the fabric itself.

- This may give sometimes the less efficient results because the nature of the fabric is not recognised by the system as the input is the image instead of the actual fabrics

- It may prove a flop show when it is used with the use of the neural networks, since the working and the design of the neurons will be a tedious and the vast part right from being the designing to the implementation scenarios

CONCLUSIONS

We summarize the various faults of the system and the defects as follows

- **Broken Ends:** This defect is caused by a bunch of broken ends woven in the fabric.

- **Broken Picks**: In plain woven fabrics, this defect materializes by the presence of two picks in the same shed for a part of the width of the fabric.

The main cause of weft breaks are rough surfaces of shuttle, shuttle box, rough or incorrect placement of shuttle eye, loose fitting of pin in the shuttle, incorrect alignment of pin with shuttle eye and low yarn strength.

- **Float**: A float is the improper interlacement of warp and weft threads in the fabric over a certain area.

- **Gout**: A gout is a foreign matter usually lint or waste accidentally woven into the fabric.

- **Hole, Cut or Tear**: The occurrence of hole, cut or tear which is self-explanatory.

Thus the overall efficiency is 85% by using this process compared to other methods of fault identification. Hence a different approach wherein various thresholding algorithms can be successively applied on the input image can yield better results. The manual textile quality control usually goes over the human eye inspection. Notoriously, human visual inspection is tedious, tiring and fatiguing task, involving observation, attention and experience to detect correctly the fault occurrence.

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